

the one to the other is unintelligible. There are many difficulties connected with the subject of potential energy which the progress of science is likely to remove, but they are not to be got over by the verbal alteration proposed by your correspondent. The energy of compressed air was at one time supposed to be potential and is now regarded as kinetic. Further inquiries into the constitution of matter may enable us to see that many forms of energy which are still regarded as potential are really "actual." Meanwhile we may, I think, suppose potential energy to mean the power of acquiring the power of doing work and to be located in the system possessing this power.

P. M.

The Arts Club, October 7

Indications of the Ice-age in Shetland

SHETLAND will now be narrowly searched for proofs of glacial action by every tourist who takes an interest in such vestiges of a bygone era. Smoothed surfaces, striae, and grooves are so abundant and distinct on Mr. Peach's ground—the sandstones on the shores of the Loch of Clickhemin, and of the immediately adjoining bay—as to have long ago suggested the innocent or waggish notion that the last were scratches made by the plows of the Norsemen! Still on the mainland, but some forty miles distant, on the shores of the magnificent bay of St. Magnus, striae are to be seen on the sandstones of the hääf-fishing station at Stennis, and till, or boulder-clay, lies in patches on the Tuans of Hillswick. Ice has made distinct markings, running east and west on the gneissose rock close by the door of the farm-house of Ailesburgh, which is perhaps about a mile north of the narrow isthmus of Mavis-Grind. The huge moraine-looking mound, which lies between the south-east foot of Ronas-hill and the head of Ronas-voe, claims a special examination by those who wish to be further satisfied as to the former existence, or otherwise, of glacial action in Shetland. G. G.

The Discoverer of Photography

IN your account of the death of Mr. Fox Talbot (NATURE, vol. xvi. p. 464), you state that he first entertained the idea of the art of what is now called photography in 1833, and that it was not till 1839 that he and Daguerre first made known the principles of photography under the name, I think, first of Daguerrotype, followed by Talbotype. I therefore think the following notes concerning Niepce may interest some of your readers:—

I cannot now from memory give exact dates, but I think it was at least ten years previous to 1839 that there lodged in a neighbouring house to where I now reside a Frenchman of the name of Niepce; he was, I think, engaged on a perpetual motion machine. He died, which necessitated his brother coming from Paris to Kew. The brother was a theatre scene-painter, and had discovered the art of fixing upon metal the pictures of objects reflected by the sun. On arriving at Kew he put up at the "Coach and Horses" Inn, then kept by Mr. Cusel, and not being able to speak English, Mr. Cusel introduced him to Mr. Francis Bauer, the celebrated botanical artist, then residing at Kew. Niepce had brought with him three pictures, specimens of his discovery, which he showed to Mr. Bauer, who became much interested in them. He deemed the discovery worthy of being made known to the Royal Society, but as the method of obtaining the pictures was not described in the notice sent to the Society, they would not entertain it, and nothing was done in the matter. Niepce returned to Paris, leaving two of the pictures with Mr. Bauer, and the third with Mr. Cusel in part payment of his bill, he being a poor man. Being a frequent visitor to Mr. Bauer, the latter naturally called my attention to the two pictures that hung in his room for at least ten years. In time Niepce let the secret of his discovery become known to M. Daguerre, and in 1839 this discovery came before the public under the name of "Daguerrotype," and about the same time "Talbotype" was announced. This led Mr. Bauer to write a letter to the *Athenæum*, fully explaining all particulars of what I have here stated from memory. In his letter Mr. Bauer said he should be happy to show the pictures to those interested in the subject. Consequently he had many callers, one of the earliest being Dr. Percy, whom I remember coming to me, wanting to know where he could find Mr. Cusel, who had then retired and was living at Richmond. Dr. Percy went off to Richmond with the intention of buying the picture, but I remember telling

him Mr. Cusel would not sell it as he was not in need of money. Such was the case, as Mr. Cusel told me some time after "that he would not sell it; no! not if he was offered 100*l.* for it." Mr. Cusel is long since dead, and what became of his picture I know not. After Mr. Bauer's death, in 1840, these two pictures came into the possession of his friend, Mr. Robert Brown, and I believe are now in the British Museum.

If you consider what I have now stated worthy of a place in NATURE, it is at your service.

J. SMITH

Park House, Kew, October 9

The Portrait of Tycho Brahe

IN reference to the portrait of Brahe engraved in NATURE (vol. xv. p. 406), and to Mr. Dreyer's remarks on it (vol. xv. p. 530), I have the pleasure of sending you the following particulars. In the first place I have permission from Herr Friis, of Copenhagen, the learned editor of *Tichonis Braheii ad eum doctorum virorum Epistole. Havnia, 1876, &c.*, to publish an important letter from himself:—

Copenhagen, June 9, 1877

DEAR SIR,—I have seen in NATURE (vol. xv. p. 405) an article on Tycho Brahe, with a portrait of him after a painting in your possession. On that account I take the liberty of addressing myself to you.

In a book printed in Copenhagen in the year 1668 is mentioned a portrait of Tycho Brahe which once belonged to King Frederick III., and which, no doubt, has had an emblematic figure and inscription similar to that of the portrait you own. The title of this book is "Inscriptiones Hafnienses latine, danicæ et germanicæ una cum inscriptionibus Amagrensibus, Urniburgicis et Stelleburgicis, &c., edi curavit Petrus Johannis Resenius," and in that you read at page 335 the following:—

"Sub pyramide tegumento quodam cooperta ad effigiem ejus quæ in Augustissimi Regis Danicæ Friderici III. Bibliotheca hodie reservatur depicta hæc legitur inscriptio:—

STANS TEGOR IN SOLIDO VENTUS FREMAT IGNIS ET UNDA
VANDESBECHI

AN. MDXCVII QUO POST DIVITINUM IN PATRIA EXILIUM DEMUM
PRISTINÆ LIBERTATI RESITUTUS FUI
TYCHO BRAHE, OT.

On leaving Denmark T. Brahe sent his portrait to his friend, the learned Holger Rosenkrantz. This has, I suppose, been one resembling the one you now possess, even if it should not be just the same. Compare T. Brahe, "Astronomiæ instauratæ mechanica." Wandesburgi, 1598, fol 4.

The German letters on the order M. H. Z. G. A. indicate Frederick the Second's motto: My hope (is) in God alone (Meine Hoffnung zu Gott allein), which is often seen in buildings, &c., from his time.

If you will be kind enough to send me a photograph of the before-mentioned portrait, I should feel very grateful to you, as I have made the biography of T. Brahe my special study, and just recently began to publish his correspondence with his learned contemporaries.

Hoping that you will not deny me this favour, I am, dear sir,
Yours obediently,

F. R. FRIIS

Cortadellers Gade, 7, Copenhagen

I have referred to an exquisite copy of the Inscriptiones Hafnienses, from the library of Colbert, belonging to Chetham's Library, in this city, and on the same page referred to by Herr Friis I find a poem by Olgier Rosenkrantz addressed to T. Brahe, and prefixed to the *Mechanica*, of which the last two lines are very interesting, as alluding, in my opinion, to the emblem on my portrait. They are:—

"Pectora quam Divi dispensant tramite justo,
Stansq. vado fluctus, imbres et flammula temne."

I wish to add a few remarks, and before I proceed farther I would observe that in your engraving the dress of Brahe is not given correctly, not from any fault of yours or of your engraver, but because the detailed drawings sent in answer to a request from him to me for details did not reach him until the plate was too far advanced. I have had the picture re-photographed, the photograph worked upon from the picture in a strong light, and a satisfactory result will be published in the *Memoirs of the Literary and Philosophical Society of Manchester*, and also, I believe, in Herr Friis's very interesting and important work, two fasciculi of which he has kindly sent me.

It is now certain that Brahe, whilst at Wandesbeck, or Wandesburg, near Hamburg, sat to a painter, for here we have evidence in a book published at Copenhagen, in 1668, that King Frederick III. had *that* picture and that it was dated Vandesbechi, 1597; and moreover, that that portrait had an emblem upon it, which, from the motto, was presumably very like that on mine, but the position and the words of the motto differing, the motto and also the inscription on King Frederick's portrait being *below* the emblem, whilst on mine the motto is on a ribbon or label wound round the pyramid, and the inscription is on the other side of the picture. In King Frederick's the emblem consisted of a pyramid with some kind of covering ("sub pyramide tegumento quodam cooperta"), and so it is in mine. That wind, fire, and water were also represented in that emblem, as in mine, is clear from the words "ventus, ignis, et unda" in the motto, which are precisely the words employed in mine, the only difference in the two cases being that in the king's there is the word "fremat," instead of "strepit" as on mine. In my portrait the year 1597 is inferred from the inscription saying "Anno 50 completo," Brahe being fifty years old on December 13, 1596. By a careful examination of Brahe's Latin Life by Gassendi, 1656, I found that Brahe wrote a remarkable poem addressed to Ranzovius, in which the words "exilium in patria" occur; and as he stayed at Ranzovius's from the end of October, 1597, I conjectured (*Proceedings of Lit. and Phil. Soc. of Manchester*, October 31, 1876) that my portrait was painted between that date and his next birth-day (December 13, 1597), a supposition confirmed by Herr Friis pointing out that the lost picture of King Frederick's is dated at Wandesburg (Vandesbechi).

That mine is no copy of that picture is manifest from the differences which the notice in the "Inscriptiones Haffnienses" has enabled me to point out. My conjecture is that Brahe sent his portrait to King Frederick, who is expressly absolved by Brahe from the blame of Brahe's expulsion from Denmark, and that he advisedly wrote "pristina libertati" instead of "libertati desiderata" as on mine; and further I have little doubt that the same or ist painted both pictures.

I have examined the portraits in the print room of the British Museum as well as the oil painting at the Royal Society, and have taken much pains to ascertain the existence of any other portrait than mine representing Brahe later than 1587; ten years earlier than mine. That it does not agree with the engraving after Gumperlin's portrait is no proof whatever that mine is not a good representation of him in his fifty-first year, when we consider how much a man's features change in the ten years between forty-one and fifty-one, and moreover Brahe may have been in the meantime to the Promontory of Noses for a fresh one. But whatever be the reasonableness of these conjectures, it is almost certain that he sat twice at Wandesburg to this portrait painter, and that one of these portraits was considered worthy of a place in the king's library.

SAMUEL CROMPTON

Manchester

Lumière Cendrée

SCHRÖTER pointed out that it is towards the third day of the new moon that the ashy light has the most intensity and that it is stronger before the new moon than after.

Schröter's explanation is that during the waning of the moon the ashy light is stronger because the moon is enlightened by the continents of Asia, Africa, and Europe, but after the new moon by the Atlantic and Pacific Oceans.

Godfray in his *Astronomy* says:—Supposing this difference to exist, and this explanation to be the correct one, the phenomenon must be just reversed in China and Japan.

Has anything been done to test the accuracy of Schröter's theory? If it is correct the ashy light cannot present the same appearance to an astronomer in New York, because there would be a greater proportion of reflecting surface in the hemisphere of the earth turned towards the moon in the one case than the other.

Schröter, I believe, found that the ashy light was stronger in autumn than in spring. This cannot be accounted for by his explanation, for the distribution of land and water remains the same.

I shall be obliged to any of your correspondents who can tell me where there are any records of observations on this subject.

B. G. JENKINS

4, Buccleuch Road, Dulwich, October 1

Lightning Conductors

IN a paper on lightning conductors, communicated by us to the *Journal* of the Society of Telegraph Engineers, we gave at full length our reasons for believing that the wire cage first suggested some years ago, and recently proposed by Prof. Clerk Maxwell, as a protection against lightning, would not act as a complete protection, since, although there is no resultant force inside a closed conductor due to exterior *static* electrification, experiment shows the existence of such a force when electric currents are passing either near or through a closed conductor. The recent case of deaths by lightning in a mine, communicated to the Asiatic Society of Bengal, on April 4 of this year, by J. J. Whitty, Esq., superintendent of the Kurhurbari Collieries, Giridhi, India, appears to add experimental proof to the reasoning advanced in our paper. Mr. Whitty says:—"The mine is a shallow one, worked by levels driven on the side of a flat-topped hill, only twenty feet from the surface, which is, therefore, the thickness of rock above the coal-seam. The working-face where the accident occurred is about 130 feet from the opening. There were a number of miners in the drift at the time. Those near the entrance were unaffected. The two who were killed (a man and a woman) were at the working-face in adjoining galleries, separated by about twelve feet of coal. A young *sdl* tree, standing as nearly as possible over the position of the accident, was slightly damaged, and in the ground at its base a hole, about one inch in diameter, seemed to have been formed by lightning. The little hill, or plateau, in which the mine is situated is one of a small irregular group in the centre of the coal field, about 200 feet high. It is formed of the coal-measure sandstone. The drainage is thorough, and the mine was quite dry. From the presence of the workmen the sides of the gallery and the air in it were probably damper than the rock. The tree or other vegetation on the hill is scanty. On the day of the accident 0.96 inches of rain fell."

It would therefore appear that the two people who were killed were practically entirely surrounded by a partial conductor in connection with the earth. It will no doubt be objected that twenty feet thickness of coal-measure sandstone, even when damp on the surface, is not a good closed conductor, but we think it is certainly as good a protection as would be afforded by the wires Prof. Clerk Maxwell proposes to lead *merely* along the edges of a building.

JOHN PERRY

W. E. AYRTON

The Imperial College of Engineering, Tôkiô, Japan,
August 6

Electric Lighting

I HAVE examined the patent (No. 10,919, November 4, 1845, Edward Augustin King) which Prof. Mattieu Williams drew attention to in *NATURE*, vol. xvi. p. 459, as anticipating the invention of Lodighin's electric wick, and I think Lodighin has been clearly forestalled in principle, the practical details alone being different in the two cases.

I do not think, however, that Mr. King's patent includes Koslof's improvement, whatever value may attach to the latter. I think it is very plain that porcelain is employed in King's patent merely as an insulating bar to connect the two forceps rigidly together without shunting any of the current between them past the carbon.

J. MUNRO

West Croydon, October 2

Caterpillars

LAST year (*NATURE*, vol. xv. p. 7) I communicated the result of some experiments on the caterpillars of *Pieris brassica* from which it appeared that, when these are artificially converted from *succincti* into *suspensi* by cutting the loop before the exclusion of the chrysalis, a certain number (a third or fourth of the whole) succeed in attaching themselves to the silk by the hooks in the tail of the chrysalis in the manner of the true *suspensi*. I have repeated the experiment this year with a like result, and I have also had the satisfaction of witnessing the process of successful exclusion, and comparing it with that of the chrysalis of *Vanessa urtica*. The method is essentially the same, except that the rapid and assured precision with which the *Vanessa* chrysalis thrusts up its tail and lays hold upon the silk, is replaced in *Pieris* by long and laborious efforts, as if the tail were just a little too short to reach the silk.

I have likewise made similar experiments with another of the